

saxLab

user manual



Welcome

Thank you for purchasing a LinPlug SaxLab 2 license.

SaxLab 2 is a professional, flexible and easy-to-use virtual wind instrument designed for creating music on your computer.

SaxLab 2 uses multi-sample playback of wind-instrument samples and incorporates a specially designed four-voice crossfade system that is capable of creating highly realistic wind instrument sounds. SaxLab 2's key features include an easy-to-use interface, a wide range of high-quality samples, an effects section that includes chorus and reverb, as well as extensive real-time modulation options. Special attention has been paid to making the performance controls as rich and responsive as possible, so that the instrument can be realistically "played".

This manual describes all aspects of SaxLab 2 and is designed so that your use of this software is as efficient and enjoyable as possible. At LinPlug we're very proud of SaxLab 2; it's the result of many years of research and synthesizer programming experience. We hope you get a lot of pleasure using SaxLab and that it becomes an integral part of your music-making.

Peter Linsener and the LinPlug team, January 2014

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Table of Contents

Installation.....	4
Features.....	5
Overview.....	6
Main.....	8
Body.....	10
Tune.....	11
Presets.....	12
ECS.....	14
Amplitude Envelope.....	15
Performance.....	17
LFO.....	25
Deviation.....	27
Effects.....	28
Chorus.....	29
Reverb.....	29
Rear Panel.....	30
Registration.....	31
Support.....	31
Glossary.....	32
MIDI Implementation Chart.....	34
Appendix A: Using TUN Files.....	35

Installation

Installation on PC

SaxLab 2 comes with its own Installer. After downloading SaxLab 2 you will find a file named "SaxLabInstallerNNN.exe" (where NNN is the respective version number) located in your web browser's download folder. Double-click on this program to begin the installation process. The Installer will guide you through the installation process.

Make sure you choose the right installation directory, so your host software finds the SaxLab 2 VSTi. Refer to your host software's manual if you are unsure about where the host software plug-in directory is located.

The instrument file "SaxLab2.DLL" and all of SaxLabs sound data will be placed in the chosen directory. The next time you start your host software SaxLab 2 will be listed in the VST Instrument list.

Installation on Mac

SaxLab 2 comes with its own Installer. After downloading SaxLab 2 you will find a file named "SaxLabInstaller200.dmg" located in your web browser's download folder. Double-click this file to decompress and open the image, then double-click the installer program to begin the installation process.

The installer will guide you through the installation process. The instrument file "SaxLab" and the SaxLab 2 Presets will now be placed in the appropriate directory for virtual instruments on your Mac. The next time you start your host software SaxLab 2 will be listed in the AU and VST instrument list.

Common to Mac and PC

Once SaxLab 2 is installed it must be registered using your personal serial number. This registration process is described in the Registration section of this manual.

If you have any questions regarding the installation of SaxLab 2 please contact our support team at www.linplug.com/support/support.htm.

Features

SaxLab 2 contains a range of features designed to make your music-making more efficient and enjoyable. These features are listed below:

- Monophonic multi-sample playback with internal four-voice crossfade.
- An adjustable mix of three sound layers for each note: the “Air” layer, the “Keys” layer and the “Pitched” layer.
- Air/Keys and Pitched sound layer crossfade point is set by MIDI velocity.
- Many different SoundSets for various wind instruments.
- User-definable, velocity-sensitive amplitude envelope.
- Tonal characteristics of the instrument’s overall sound can be defined by the user.
- Real-time control of the instrument’s brightness, reverberation amount and “Growl” effect.
- Three modes of mono performance: Legato, Retrigger, Alternate
- Control of Pitch Bend and Scoop.
- Random pitch deviation per note.
- Random “air” deviation per note.
- Random body frequency deviation per note.
- Envelope, LFO and MIDI-controlled vibrato and tremolo.
- Stereo chorus and stereo reverb effects.
- Microtuning support.
- MIDI control available for every instrument parameter.

Overview

SaxLab 2 is a monophonic wind instrument synthesizer with some unique features. The synthesizer is based upon a multi-sample-playback design and includes a three-layered, four-voice crossfade for each note produced.

The structure of SaxLab 2 synthesizer can be divided into nine sections: Tune, Preset, Envelope, Body, Main, Performance, LFO, Deviation and FX (Effects).



Audio signals are generated by a sample-playback synthesizer that gets pitch, velocity and controller information from the instrument's MIDI input. The MIDI input is automatically connected to MIDI output of the host software. SaxLab 2 receives MIDI on all channels simultaneously.

SaxLab2's Sound Set determines the samples that are used by the instrument. The Sound Set is selected in the Sound Set popup menu located in the Main section. The particular scale tuning used by the SoundSet is set in the instrument's Tune section, along with its overall tuning settings.

In SaxLab 2, a note consists of three layers: the Main layer, the Keys layer and the Air layer. The Main layer contains the pitched component of the sound. The Keys layer contains the characteristic key "clicks" heard in some wind instruments (especially in saxophones and clarinets). The Air layer contains the breath and "airflow" sounds that are an important part of the sound of a wind instrument.

The relative levels of the three layers are set using controls in the instrument's Main section. The relative levels of the three layers also respond to MIDI note velocity. For example, when playing soft notes, the volume level of the Air and Keys layers increases with respect to the Main layer. This replicates the behaviour of a real wind instrument which becomes relatively "noisier" as it is played more quietly. When playing louder notes the Main layer becomes proportionately louder and comes to dominate the sound.

The Main layer of each SaxLab 2 note also includes an internal four-voice crossfade which enables smooth legato transitions from one part of a note's envelope to another. This crossfade also enhances note-to-note transitions which are very important in recreating realistic wind instrument sounds.

The output of the sample-playback oscillator is routed to SaxLab 2's Body section. The Body section contains a filter which modifies the frequency spectrum of the oscillator's output. Here the overall tonal characteristics of the currently loaded SoundSet can be modified.

An important part of the sound of a real acoustic instrument arises from the real-time modulation of its sound. SaxLab 2 enables the user to modulate its sound using three sources: envelopes, LFOs (Low Frequency Oscillators) and MIDI controllers.

SaxLab 2's Amplitude Envelope section is used to control the way that the instrument's amplitude varies over time and includes controls for Attack Time, Decay Time and Release Time. A second modulation source is SaxLab's LFO which can be mapped to either or both of the sound's amplitude and pitch and so can be used to create either tremolo or vibrato effects. A third modulation source is real-time MIDI controllers. These can be mapped to numerous destinations. Examples include MIDI Velocity to the amplitude envelope depth, Modulation Wheel to LFO depth and MIDI Breath Control to brightness.

Note that for a realistic emulation often the control of SaxLab "Bright" by Velocity leads to a more realistic performance than using the "Amp" by Velocity. Actually Velocity should control more of the brightness ("Bright") and less of the amplitude ("Amp").

Another important part of the sound of a real acoustic instrument is that no two notes are exactly the same. No matter how hard the player may try, each note is slightly different. Our ears are very sensitive to these differences and can easily detect when two notes are identical. For this reason, SaxLab 2 incorporates Body, Air and Pitch Deviation controls which introduce small random variations to the Body filter, the "air" component of the sound, and to the overall pitch of the note each time a note is triggered.

SaxLab 2's Effects section contains two effects: Chorus and Reverb. The Chorus effect can be used to "thicken" a single sound creating the impression that it contains multiple voices. The Reverb effect is used to create the impression that the instrument is being played in a real acoustic space.

The audio outputs of SaxLab 2 are automatically connected to the input of your host software's mixer. Here you can set the pan position of SaxLab 2's output. Hopefully, this section has given you a brief overview of how SaxLab 2 works. More detailed information can be found in the following sections.

Main

SaxLab 2's Main section is located in the middle of the instrument's Front Panel. It contains controls for selecting the current Sound Set as well as for setting the relative levels of the instrument's three sound layers. It also contains a MIDI indicator that shows when incoming MIDI Note-on messages are received.



Sound Set: SaxLab 2's Sound Set control is used for selecting the current Sound Set. Each Sound Set is a collection of samples that the instrument uses to generate sound. Each Sound Set is made up of three layers: the Main layer, the Air layer and the Keys layer. These three layers are mixed to produce the instrument's overall sound. The Sound Set should not be confused with a Preset. The former is a collection of samples used by the instrument, while the latter is a "snapshot" of all the instrument's current

settings, and an associated Sound Set. As such, many Presets can utilize the same Sound Set.

Keys: The Keys control sets the volume of the Keys sample layer. This layer contains the characteristic key “clicks” usually heard in saxophones and clarinets. Increasing the value of the Keys control makes the Keys layer louder with respect to the instrument’s other two layers.

VOL (Volume): The VOL (Volume) control sets the volume of the pitched sample layer. This layer contains the pitched component of the sound. Increasing the value of the VOL (Volume) control makes the pitched component of the sound louder with respect to the instrument’s other two layers.

Air: The Air control sets the volume of the Air sample layer. This layer contains the breath and “airflow” sounds that are an important part of the sound of a real wind instrument. Increasing the value of the Air control makes the Air layer louder with respect to the instrument’s other two layers.

Note: When using “Layered” or “Soft” Sound Sets it is recommended to only use very low “Air” noise settings since these sets include soft played tones which are naturally already noisy.

MIDI: The MIDI indicator lights up when any incoming MIDI Note-on messages are received by SaxLab 2. Clicking and holding down a mouse button while the cursor is over the MIDI indicator automatically plays a C3 note. The note is turned off when releasing the mouse button.

Body

SaxLab 2's Body section is located in the middle of the instrument's Front Panel above the Main section. The Body section contains a filter with three controls that allow you to shape the overall timbre of the instrument.



RES (Resonance): The RES control is used to set the amount of emphasis around the filter's cutoff frequency. Higher settings create a more pronounced peak in the signal while lower settings produce a flatter response.

FREQ (Frequency): The FREQ control is used to set the frequency at which the filter begins to take effect. Higher settings produce brighter sounds while lower settings result in darker sounds.

Bright (Brightness): The Bright control is used to set the brightness of the instrument's sound. Higher settings will produce a more strident tone, while lower settings will produce a softer, cooler sound.

Tune

SaxLab 2's Tune section is located on the upper left of the instrument's Front Panel. This section consists of four controls: Coarse (Tune), Fine (Tune), the Tuning Display and Scale.



Coarse (Tune): The Coarse (Tune) control is used to set the overall pitch of the instrument in semitone steps. Control settings range from -11 semitones to +11 semitones.

Fine (Tune): The Fine (Tune) control is used to set the overall pitch of the instrument in cents. A cent is 1/100 of a semitone. Control settings range from -100 cents (-1 semitone) to +100 cents (+1 semitone).

Note that the overall pitch of the instrument can be raised or lowered by one octave using a combination of the Coarse Tune control and the Fine Tune control.

Also note that the Coarse Tune control and the Fine Tune control are used to set the root note of the current scale. The controls transpose the scale's starting pitch to the selected pitch. Remember that if you use tunings other than Equal Temperament, the overall pitch of the instrument must be set to the root note of the key in which you wish to work. Otherwise, the notes of the scale will not have the correct pitch.

Tuning Display: The Tuning Display is located to the right to the two tuning controls. It displays the instrument's current tuning in semitones and cents. For example, a setting of "+4.79" means that the instrument is currently tuned 4 semitones and 79 cents sharp of its default setting.

Scale: The Scale control is used to set the Micro Tuning (TUN) file that SaxLab 2 uses. The TUN file is a list of pitches that the instrument uses to determine the pitch at which it plays back samples. Most Western music uses a pitch system called Equal Temperament in which the smallest interval between two adjacent notes is defined by the ratio 1:1.05946. For example, A4 has a frequency of 440 Hz. In this case, A#4 (the next highest note available on a keyboard) has a frequency of 440×1.05946 which equal 466.2 Hz.

SaxLab 2 comes with a wide selection of different TUN files. For more about TUN files please see Appendix A: Using TUN Files.

Presets

SaxLab 2's Presets section is located on the upper right of the instrument's Front Panel. The Preset section contains the Preset Display and File Browser as well as the MIDI Learn ECS.



Preset Display/File Browser

Preset Display/File Browser: The Preset Display consists of two displays. The upper one shows the Current Bank and the lower one shows the Current Preset. Whenever a new Preset is loaded using the file controls found below these displays, the Current Preset display is updated with the name of the new Preset and the Current Bank is updated with the name of the directory that contains the new Preset.

By default the File Browser points to the factory presets installed with SaxLab 2. Presets can be changed in three different ways. A new Preset can be loaded using the file controls, which work by clicking the Prev/Next ("arrow") buttons located below the Current Preset display. Alternatively, the desired Preset can be selected directly from the Current Preset display, which turns into a menu when it is clicked. A Preset can also be changed by sending a MIDI program change command to the instrument.

The Current Bank can be changed by loading a Preset from a different directory or by selecting the desired location from the Current Bank display, which turns into a menu when it is clicked.

The File Controls located to the right of the Prev/Next ("arrow") buttons are used for all File-related operations. The Load button opens a dialog that lets a previously saved Preset be selected for loading. The Save button allows the current settings to be saved as a new Preset.

The settings of all sections are saved with the Preset. SaxLab 2 loads and saves all of its Presets directly to hard disk so your computer's RAM does not limit the number of available Presets. Note that when you load a Preset using the Preset section's controls, the previous Preset is erased so if you want to keep the previous Preset make sure you save it before loading another one.

ECS

The ECS (Easy Controller Setup) section makes it simple to control SaxLab 2 from an external MIDI controller (either hardware or software). All you have to do is switch on the ECS indicator (click it once), select a SaxLab 2 parameter with the mouse and then send some MIDI messages to the SaxLab 2 from your MIDI source. That's all there is to it! From now on you can change the parameter with that controller. In addition to this, more than one controller can be defined to change a particular parameter. In fact, you can define up to 128 parameter-controller-combinations. This does not depend on the type of controller you have nor the particular MIDI Control Change messages it sends. Don't forget to switch off ECS after you have finished using it. To do this, click the indicator again.

Clicking on the ECS label opens the ECS menu. The menu contains the following functions: Off, Learn, Clear, Clear All, Save, Rest.Fact. (Restore Factory Settings). These functions are explained below.

Off: The Off menu item turns off ECS. If ECS is already off then selecting this menu item has no effect.

Learn: The Learn menu item turns on ECS. Once ECS is on, a target control can be selected with the mouse. Any MIDI Control Change messages sent to the instrument will then be routed to the selected control.

Clear: The Clear menu item turns on ECS and prepares the instrument for the disconnection of previously-assigned MIDI Control Change messages from their destinations. After selecting the Clear menu item, clicking on a SaxLab 2 control disconnects the previously assigned MIDI controller from the selected destination. After clearing a SaxLab 2 control, the selected control no longer receives MIDI Control Change messages.

Clear All: The Clear All menu item disconnects all previously-assigned MIDI Control Change messages from their destinations. After clearing all SaxLab 2 controls, no control receives MIDI Control Change messages.

Load: The Load menu item enables a previously saved MIDI controller routing configuration to be restored.

Save: The Save menu item enables the current MIDI controller routing configuration to be saved.

Rest.Fact: The Rest.Fact (Restore Factory Settings) restores SaxLab 2's default ECS settings, which is equivalent to Clear All.

Amplitude Envelope

SaxLab 2's Envelope section is located on the middle left of the instrument's Front Panel. Because SaxLab 2 uses samples for playback, the envelope of the sound it produces is determined to a large extent by the envelope of the sample that is currently being played. This can be limiting, as it precludes real-time control of the instrument's amplitude. In order to make the instrument more responsive to the player, SaxLab 2 contains an Envelope section which incorporates four controls: ENH (Enhance), A (Attack), D (Decay) and R (Release).



ENH (Enhance): The ENH (Enhance) control setting determines the degree to which the first few milliseconds of a note's amplitude envelope are amplified. The ENH (Enhance) control can be used to create a prominent attack transient, so that the "piff" sound at the beginning of a note is emphasised. This is very useful for creating rhythmic accents.

A (Attack): The A (Attack) control setting determines the length of time it takes for the amplitude envelope to reach the full envelope depth. For example, if the A (Attack) slider is set to 0, the sound's amplitude will move from zero to full volume within the shortest possible amount of time.

D (Decay): The D (Decay) control setting determines the length of time that the amplitude envelope takes to move from the Attack peak level to the

Sustain level. Setting the D (Decay) slider to higher values increases the time taken for the sound's amplitude to move from full volume to the sustain level.

R (Release): The R (Release) control is used to set the length of time that the amplitude envelope takes to move from the current level to silence after the key is released. Setting the R (Release) slider to higher values increases the time taken for the sound's amplitude to decrease to zero.

Note: The Sustain level is reached at the end of the Decay phase and is fixed at 50% of the maximum level (that is reached at the end of the Attack phase).

The time range of A and R are actually useful only for special effects, as a real sax doesn't have a meaningful release time and the attack time is controlled in realtime by the player. So for a good emulation these parameters should stay close to zero (bottom of the fader), but not zero. For a slow attack the attack time (or the main volume) should be controlled by a MIDI controller (see section ECS).

Performance

The Performance section is located on the middle right of SaxLab 2's Front Panel. The Performance section features the following controls:

- Scoop (Amount),
- PB- (Pitch Bend Down Amount) with Display,
- PB+ (Pitch Bend Up Amount) with Display,
- AMP (Amplitude) Depth, Control Source and Control Response Curve,
- BRI (Brightness) Depth, Control Source, and Control Response Curve
- REV (Reverb) Depth, Control Source and Control Response Curve
- GRO (Growl) Depth, Control Source, Control Response Curve,
- Maximum Depth and Deviation,
- CT (Crossfade Time) and
- Monomode.



Scoop (Amount): This control is used to set the amount of time it takes to move from a lower pitch to the pitch of the note that is actually played. Increasing the value of the Scoop control increases the time taken for the pitch to move from the lower pitch to the note that is actually played. Scoop

can be thought of as an auto-bend that is applied at the onset of a note. Scoop is not applied to notes that are played legato. The scoop is a style mode used in sax playing and it's often used in Jazz and Rock since it's easy with sax and clarinet to initially pitch the note lower than intended.

PB- (Pitch Bend Down Amount): This slider is used to set SaxLab 2's response to incoming MIDI Pitch Bend messages that are below the midpoint of the MIDI controller's Pitch Wheel. The slider can be adjusted over a range of 0 to 12 semitones. The current value of the PB- control is shown in the Pitch Bend Down Range Display which is located above the slider. Note that downward Pitch Bend only operates in the lower half of the Pitch Wheel's range. Increasing the value of the PB- (Pitch Bend Down Amount) control will increase the range of the lower half of the instrument's Pitch Wheel.

PB+ (Pitch Bend Up Amount): This slider is used to set SaxLab 2's response to incoming MIDI Pitch Bend messages that are above the midpoint of the MIDI controller's Pitch Wheel. The slider can be adjusted over a range of 0 to 12 semitones. The current value of the PB+ control is shown in the Pitch Bend Up Range Display which is located above the slider. Note that upward Pitch Bend only operates in the upper half of the Pitch Wheel's range. Increasing the value of the PB+ (Pitch Bend Up Amount) control will increase the range of the upper half of the instrument's Pitch Wheel.

Note: Scoop and Pitch bend ranges must not be abused for a realistic Sax sound, best is to use small values so that the formants of the sax are preserved.

AMP (Amplitude Control Depth): This control sets the degree to which the currently selected control source (see below) affects the instrument's amplitude which is set in the Main section. Increasing the value of this control makes the instrument more responsive to changes in the incoming MIDI data.

Amplitude Control Source: This control is used to set the type of MIDI control change message that controls the instrument's AMP (Amplitude Control Depth) setting. Three options are available: Velo (Velocity), BC (Breath Controller) and AT (Aftertouch). Only one type of MIDI Control Change message can be used at a time .

Amplitude Control Response Curve: This setting determines how the AMP (Amplitude Control Depth) control responds to incoming MIDI messages selected with the Amplitude Control Source. The control is continuously variable and ranges from inverse logarithmic through linear to logarithmic. The chosen shape works as a "transfer function" which scales the incoming MIDI messages so that their "effective working range" is changed. This can be used to make the instrument more sensitive to MIDI control change messages in a particular portion of the controller's range. For example, in the case of a logarithmic curve, the effective working range is scaled upwards so that changes in the upper portion of the controller's range have most effect on the destination. A linear curve passes the MIDI messages unchanged.

Bright (Brightness Depth): The Bright control sets the degree to which the currently selected control source (see below) affects the Body section's Bright (Brightness Depth) control. This in turn sets the overall brightness of the

instrument's sound. Increasing the value of this control makes the instrument more responsive to changes in the incoming MIDI data.

Brightness Control Source: This control is used to set the type of MIDI control change message that controls the instrument's Bright (Brightness) setting. Three options are available: Velo (Velocity), BC (Breath Controller) and AT (Aftertouch). Only one type of MIDI control change message can be used at a time.

Brightness Control Response Curve: This setting determines how the Bright control responds to incoming MIDI messages selected with the Brightness Control Source. The control is continuously variable and ranges from inverse logarithmic through linear to logarithmic. The chosen shape works as a "transfer function" which scales the incoming MIDI messages so that their "effective working range" is changed. This can be used to make the instrument more sensitive to MIDI control change messages in a particular portion of the controller's range. For example, in the case of a logarithmic curve, the effective working range is scaled upwards so that changes in the upper portion of the controller's range have most effect on the destination. A linear curve passes the MIDI messages unchanged.

REV (Reverb Mix): The Rev control sets the degree to which the currently selected control source (see below) affects the Reverb section's Mix control. This in turn sets the overall mix of the instrument's wet and dry sound. Increasing the value of this control makes the instrument more responsive to changes in the incoming MIDI data.

Reverb Mix Control Source: The Reverb Mix Control Source is used to set the type of MIDI control change message that controls the instrument's Reverb Mix setting. Three options are available: Velo (Velocity), BC (Breath Controller) and AT (Aftertouch). Only one type of MIDI control change message can be used at a time.

Reverb Control Response Curve: This setting determines how the Reverb Mix control responds to incoming MIDI messages selected with the Reverb Mix Control Source. The control is continuously variable and ranges from inverse logarithmic through linear to logarithmic. The chosen shape works as a "transfer function" which scales the incoming MIDI messages so that their "effective working range" is changed. This can be used to make the instrument more sensitive to MIDI control change messages in a particular portion of the controller's range. For example, in the case of a logarithmic curve, the effective working range is scaled upwards so that changes in the upper portion of the controller's range have most effect on the destination. A linear curve passes the MIDI messages unchanged.

A characteristic component of a saxophone's sound is the "growl" that is created when the player sings or hums a note while playing the instrument. Depending upon the circumstances, the hummed note may be harmonically related to the note played, or it may be completely unrelated. SaxLab 2 enables the user to add "growl" to the instrument's sound via the Growl controls in the Performance section.

GRO (Growl Depth): This control sets the degree to which the currently selected control source (see below) effects the presence of the “growl” effect in the instrument's sound. Increasing the value of this control makes the instrument more responsive to changes in the incoming MIDI data.

Growl Control Source: The Growl Control Source is used to set the type of MIDI control change message that controls the “growl” component of the instrument's sound. Three options are available: Velo (Velocity), BC (Breath Controller) and AT (Aftertouch). Only one type of MIDI control change message can be used at a time.

Growl Control Response Curve: This setting works just like already described for the Amp, Brightness and Reverb Control Response Curve.

Growl Maximum Depth: The Growl Maximum Depth control sets the maximum volume level of the growl component of the instrument's sound. Note that this control works in conjunction with the Growl Deviation control (described below). If the Growl Deviation control is set to 0, then the level of the growl component of the instrument's sound is determined by the setting of the Growl Maximum Depth control. If the Growl Deviation control is set to a value other than 0, then the level of the growl component of the instrument's sound will randomly vary between 0 and the current value of the Growl Deviation control for each note that is played.

DEV (Growl Deviation): The DEV (Growl Deviation) control is used to set a degree of randomisation in the “growl” component of the instrument's sound. Increasing the DEV (Growl Deviation) control will introduce more random variation in the amount and tone of the growl component of the instrument's sound from note to note.

Three MIDI controllers are available for modulating SaxLab 2's various Performance parameters. These are: Velo (Velocity), BC (Breath Controller) and AT (Aftertouch). Each controller works in a slightly different way. Note that only one type of MIDI control change message can be used for each Performance Control at a time.

Velo (Velocity): All MIDI controllers have the ability to trigger a note. This is usually done by transmitting a MIDI Note-On message. Note-On messages consist of three bytes: a Status byte and two Data bytes. The second Data byte contains the velocity at which the key was pressed. In most cases, key velocity is used to determine the loudness of the synthesized sound. Note that only one Note-On message is transmitted for each note that is played.

BC (Breath Controller): MIDI Wind controllers typically transmit breath pressure information as MIDI Breath Control messages. Breath Controller messages consist of three bytes: a Status byte and two Data bytes. The message's first Data byte defines the type of Control Change message (in this case, Breath Control), which has a value of 0x02. The second Data byte determines the current output value of the Breath Controller.

Note that new Breath Controller messages are transmitted whenever the controller's input changes, so that Breath Controller messages can vary over

the duration of a note. Also note that MIDI keyboards normally do not transmit Breath Controller messages, however it is usually possible to reassign the output of other MIDI controllers (such as the Mod Wheel) so that they transmit MIDI Breath Controller messages.

AT (Aftertouch): Many types of MIDI keyboard have the ability to detect how much pressure is applied to a key. This pressure can be varied continuously as the note is sounding. MIDI messages that transmit the current value of the key pressure are called Aftertouch messages.

Aftertouch messages consist of a Status byte and two Data bytes. The message's first Data byte defines the note value while the second Data byte determines the current Aftertouch value. Aftertouch values can range from 0 to 127. Note that not all MIDI keyboards transmit Aftertouch messages. however it is usually possible to reassign the output of other controllers so that they transmit MIDI Aftertouch messages.

In order to produce realistic wind instrument sounds it is important to be able to control the way that notes are triggered and connected to subsequent notes. On a real wind instrument the player can choose to play each note separately, or to connect notes to the ones that follow. If each note is played separately, then each has its own attack portion. If two or more notes are played in a “legato” (connected) manner then only the first note will have an attack portion. This can be imitated on a keyboard by using a combination of playing technique and SaxLab 2's Monomode setting. Three modes are available: Leg (Legato), Alt (Alternate) and Ret (Retrigger). With respect to these three settings, the key point to understand is the difference between playing keyboard notes that overlap and playing notes that are detached.

First, let's consider SaxLab 2's Ret (Retrigger) mode. In this mode, no matter how you play keyboard notes (legato or detached), each note will have an attack portion. In this case, each note will sound as a complete and separate note.

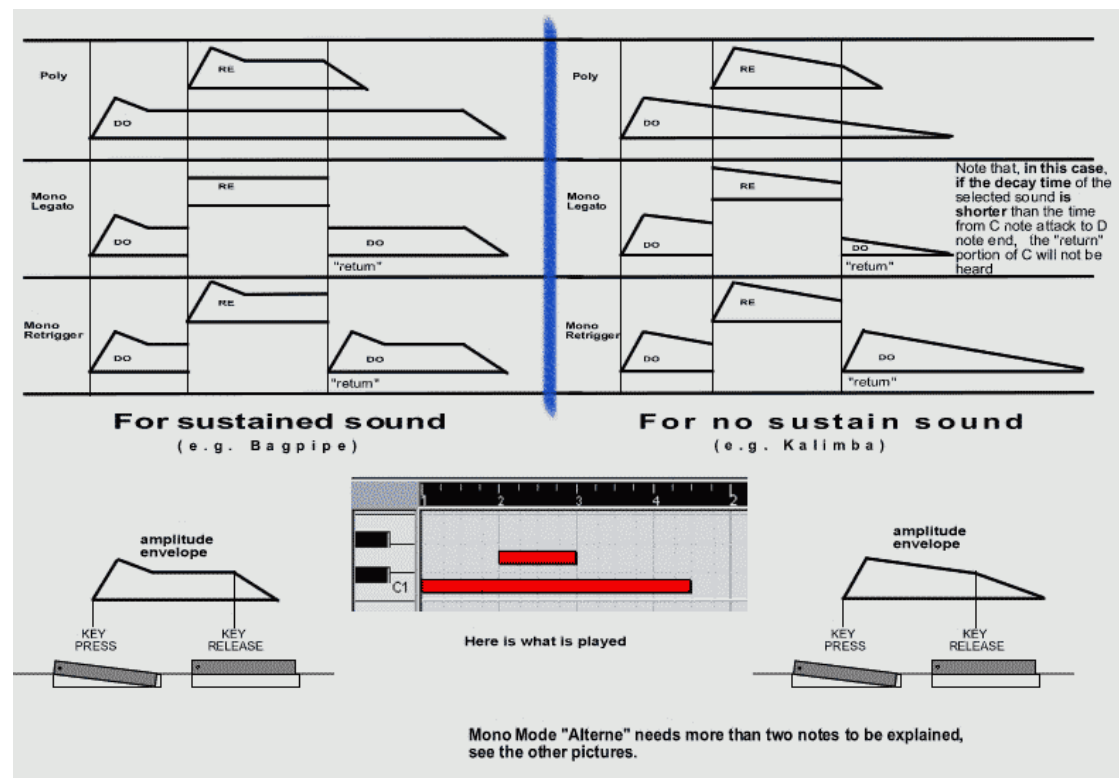
Next, let's consider SaxLab 2's Leg (Legato) mode. In this case, if two or more notes are played in a “legato” (connected) manner, where the following note is played before the previous note is released, then only the first note will have an attack portion. Notes following the initial note will be automatically connected to the preceding note. However, notes that are played in a detached manner will still have an attack portion. In this way, the keyboard playing style that is used determines how notes play back.

Alt (Alternate) mode combines the two modes described above. In this case every second legato note has its own attack portion regardless of how it is played. Notes that are played in a detached manner will still have their own attack portion.

The differences between Leg (Legato) and Ret (Retrigger) modes are illustrated in the pictures shown below. The main difference between Leg (Legato) mode and (Ret) Retrigger mode is in the way the samples are retriggered. In Leg (Legato) mode, the instrument will only play the attack portion of the sound if the previous key has been released before the next key

is played. In Ret (Retrigger) mode, the instrument starts a new envelope each time a note is played. In all modes, the envelope retriggers if notes are separated.

Note: For Alternate and Retrigger a small amount of “ENH” (Enhance) might be most effective for realistic results.



In SaxLab 2's Alt (Alternate) mode, sample triggering alternates between Leg (Legato) mode and Ret (Retrigger) mode for each note in a legato sequence.

Shown below is the same sequence of notes played three times, each time with a different Monomode setting. In each case arrows mark where the envelopes start for each note.



CT (Crossfade Time): The CT (Crossfade Time) control is used to set the length of time taken to move from the pitch of the previous note to that of the note currently being played. However, the CT (Crossfade Time) is more than just a conventional portamento control. When the CT (Crossfade Time) is set to zero, the length of the crossfade time is the same for all notes regardless of their duration. As the value of the CT (Crossfade Time) is increased, the portamento time becomes adaptive and is determined by the duration of the previous notes. This means that a note with a long duration will have a correspondingly long crossfade time. A note with a shorter duration will have a shorter crossfade time. This is useful for playing passages that contain notes

with a mixture of different durations. For example, say that SaxLab 2's crossfade time was constant and set to a long duration. In the case of notes with a short duration this could mean that there might not be enough time for the pitch of the instrument to reach the current note's pitch before the next note was played. SaxLab 2's adaptive crossfade time means that the crossfade time changes according to the duration of the notes being played. In effect, it provides adaptive note articulation so that the pitch of the target note is always reached. Note that the CT (Crossfade Time) only operates when the instrument is in Legato mode.

Note: Usually a setting of 30 should be a good setting, however, its possible to customize this value to the playing style and taste.

LFO

SaxLab 2's LFO (Low Frequency Oscillator) section is located on the lower left of the instrument's Front Panel. The LFO section contains nine controls for setting various parameters of the instrument's LFO. The controls include: DEL (Delay), ATK (Attack), Rate, Pitch, AMP, CTD (Controller Depth) and Controller Source. SaxLab 2's LFO works slightly differently to other synthesizer LFOs so you may want to read the following section carefully.



DEL (Delay Time): The DEL (Delay Time) control is used to set a time delay between the note onset and when the LFO begins to modulate the instrument's output. If this is used in conjunction with the ATK (Attack Time) control then the LFO's attack envelope will not begin until the delay time has elapsed.

ATK (Attack Time): The ATK (Attack Time) control is used to set the amount of time taken for the LFO to move from zero to the current value of the Pitch and Amp controls.

Rate: The LFO's Rate control functions differently depending upon whether or not a MIDI Controller Source (see below) is selected. If a MIDI Controller Source is not currently selected then the Rate control sets a default oscillator frequency for the LFO. When a MIDI controller is selected as a Controller Source the Rate control sets a minimum rate for the LFO. In this case, the

maximum LFO Rate is set by the combined values of the Rate and the CTD (Controller Depth) controls.

Pitch: The LFO's Pitch control is used to set the maximum depth to which SaxLab's overall pitch is modulated by the LFO. This can be used to create vibrato effects.

AMP (Amplitude): The LFO's AMP (Amplitude) control is used to set the maximum depth to which SaxLab's overall amplitude is modulated by the LFO. This can be used to create tremolo effects.

CTD (Controller Depth): The CTD (Controller Depth) control sets the degree to which the currently selected MIDI controller (see below) affects the LFO's settings. Note that the setting of this control can also influence the LFO rate.

Controller Source: Three MIDI controllers are available for modulating the LFO's various parameters. These are: AT (Aftertouch), PW (Pitch Wheel) and MW (Modulation Wheel). Each works in a slightly different way. Note that only one controller can be selected at a time.

AT (Aftertouch) increases the LFO's modulation frequency starting from the current value of the Rate control up to the combined values of the Rate and CTD (Controller Depth) controls using MIDI Aftertouch messages. The maximum available rate is set by a combination of the LFO Rate setting and the CTD (Controller Depth) setting. Note that Aftertouch can only increase the LFO rate from the value set in the Rate parameter. It cannot be used to decrease the LFO rate below the setting of the Rate control.

PW (Pitch Wheel) increases the LFO's modulation frequency starting from the current value of the Rate control up to the combined values of the Rate and CTD (Controller Depth) controls using Pitch Bend Control Change messages. The maximum available rate is set by a combination of the LFO Rate setting and the CTD (Controller Depth) setting. Note that the Pitch Bend setting can only increase the LFO rate from the value set in the Rate parameter. It cannot be used to decrease the LFO rate below the setting of the Rate control. Also note that the PW (Pitch Wheel) operates from its default "central" position to its maximum value. The lower half of its range has no effect on the LFO rate (but it still affects the instrument's pitch, which is useful since saxophones usually bend to lower pitches).

MW (Modulation Wheel) increases the LFO's modulation frequency starting from the current value of the Rate control up to the combined values of the Rate and CTD (Controller Depth) controls using Modulation Wheel Control Change messages. The maximum available rate is set by a combination of the LFO Rate setting and the CTD (Controller Depth) setting. Note that the Modulation Wheel setting can only increase the LFO rate starting from the value set in the Rate parameter. It cannot be used to decrease the LFO rate below the setting of the Rate control. However, if the MW (Modulation Wheel) is set to zero, then the Pitch and AMP values will be scaled to zero, effectively fading out the LFO so that it no longer modulates the instrument's output. Even though the LFO Rate has not decreased below the current Rate value, the effect of the LFO is no longer heard. In most cases, this controller should be used with the ATK (Attack Time) and the DEL (Delay Time) set to zero.

The LFO's MIDI controller implementation may at first seem complicated however its operation has been designed with the following scenario in mind. The user first sets the balance between the Pitch and AMP controls with the Pitch and AMP controls. Then the default LFO frequency is set with the Rate control. If the user then selects the Modulation Wheel as the Controller Source they can bring in the LFO, increase its modulation depth, (proportionally for Pitch and AMP), while accelerating the LFO rate from the setting of the Rate control to the maximum value set by the combination of the Rate control and the CTD (Controller Depth). This is a more realistic way to create vibrato, starting from zero, and increasing the rate and depth, until the intended level of intensity is reached. In this way, the user can quickly move from different amounts of vibrato at any speed they desire.

Deviation

SaxLab 2's Deviation section is located in the lower middle of the instrument's Front Panel. An important part of the sound of a real acoustic instrument is that no two notes are exactly the same. No matter how hard the player may try, each note is slightly different. Our ears are very sensitive to these differences and can usually detect when two notes are identical. For this reason, SaxLab incorporates Body, Air and Pitch Deviation controls which introduce small random variations to the Body filter, the "air" layer of the sound, and to the overall pitch of a note each time it is triggered.



Body (Deviation Amount): The Body (Deviation Amount) control is used to set a degree of randomisation in the instrument's Body filter for each note that is played back. Increasing the Body (Deviation Amount) control will introduce more random timbre variation from note to note in the sound of the instrument.

Air (Deviation Amount): The Air (Deviation Amount) control is used to set a degree of randomisation in the instrument's "air" layer for each note that is played back. Increasing the Air (Deviation Amount) control will introduce more random timbre variation from note to note in the sound of the instrument.

Pitch (Deviation Amount): The Pitch (Deviation Amount) control is used to set a degree of randomisation in the instrument's overall pitch for each note that is played back. Increasing the Pitch (Deviation Amount) control will introduce more random variation from note to note in the instrument's overall pitch.

Effects

SaxLab 2's FX (Effects) section is located on the lower right of the instrument's Front Panel. Two internal effects are available: Chorus and Reverb.



Chorus

SaxLab 2's Chorus effect can be used to "thicken" the instrument's monophonic output creating the impression that it contains multiple voices. SaxLab 2's Chorus features controls for: Mix, DPTH (Depth) and SPD (Speed). Also note that the output of the Chorus effect is stereo.

The Chorus effect is switched on and off by clicking on the LED to the right of the "Chorus" label.

Mix: The Mix control is used to set the balance between the processed "wet" signal and the original unprocessed "dry" signal.

DPTH (Depth): The DPTH (Depth) control is used to set the amount that the effect modulates the original signal. By increasing the DPTH (Depth) slider a more detuned sound is produced.

SPD (Speed): The SPD (Speed) control sets the rate at which the signal is modulated.

Reverb

The Reverb effect is used to add ambience to sounds. It features controls for Mix, Space and DAMP (Damping).

The Reverb effect is switched on and off by clicking on the LED to the right of the "Reverb" label.

Mix: The Mix control allows you to set the balance between the processed "wet" signal and the original unprocessed "dry" signal.

Space: The Space control is used to set the size of the simulated room. The size of the "space" varies from a small chamber up to a large hall.

DAMP (Damping): The simulated room's wall materials can be adjusted with the DAMP (Damping) control. This parameter ranges from practically loss-free reflecting walls (no damping) up to very absorbent walls (full damping). In practical terms, the amount of damping determines the amount of high frequency sound components that are contained in the processed signal; the higher the DAMP (Damping) setting, the less high frequencies are contained in the processed signal.

Rear Panel

SaxLab 2's Rear Panel is accessed by clicking on the SaxLab 2 logo on the instrument's Front Panel. The Rear Panel contains a control for the path to the library, an edit box which is used for registering the instrument and a display that shows the version of the instrument.



Library: The Library Path is located on the upper left of the instrument's Rear Panel. Usually it points to where the library have been installed, however, if you want to move the library to a different location you can do this and use this control to make the new location available to SaxLab. After clicking the folder icon a file dialog opens and allows you to browse to the library.

Attention: You cannot select the folder directly, you need to locate the library, then open the “Alto Layers” folder and open the “sax.sxlbsnd” file in it. After adjusting the path to the library you need to restart SaxLab, that is to unload it completely and load it again.

Serial Number: The Serial Number edit box is located on the upper left of the instrument's Rear Panel. The Serial Number edit box is used to register the instrument. Note that before entering a valid serial number, the Serial Number edit box reads “Enter here”. After a valid serial number has been entered the Serial Number edit box reads “Valid”.

Version Number: The Version Number display is located on the upper right of the instrument's Rear Panel. It shows the version of the instrument.

Clicking on the SaxLab 2 logo in the middle of the Rear Panel returns you to the Front Panel.

Registration

After you've installed and opened the full version of SaxLab 2, go to the instrument's Rear Panel (see the Rear Panel section of this manual for more information about the instrument's Rear Panel). The Serial Number edit box will read "Enter here". Enter the serial number you have received into the Serial Number edit box. If the serial number has not been entered or it has been entered incorrectly, the SaxLab 2 will run in demo mode.

After entering the serial number correctly, the Serial Number edit box displays the word "Valid" indicating that the instrument is registered. Once registered, the serial number is no longer displayed on the instrument. Make sure to keep your serial number in a safe place as you might need it again to register SaxLab, in example when you bought a new computer.

If you have any questions regarding SaxLab 2's registration process, please visit our support area at www.linplug.com/support/support.htm.

Support

Should you have any questions or comments regarding the LinPlug SaxLab 2 please contact us via following website:

<http://www.linplug.com/Support/support.htm>

Glossary

- Amplifier:** A signal processing device that changes the amplitude, and hence the loudness, of a signal.
- Amplitude:** With respect to sound, the peak amount of variation above and below atmospheric pressure caused by the compression and rarefaction components of a sound. Amplitude indicates the amount of energy in a sound and generally correlates with our perception of "loudness". The term can also apply to any signal, hence the term "Amplitude Envelope" which is used to describe the way a synthesizer's loudness varies over time when a note is played.
- Chorus:** The creation of the perception of multiple unison voices from a single voice.
- Crossfade:** The process of mixing two audio signals together by increasing the amplitude of one as the amplitude of the other is decreased.
- Effect:** A signal processing device that changes some aspect of the input signal. An enormous number of different effect types are available. These include Chorus (which produces a thickening of the signal), Delay (adding echoes to the signal) and Distortion (which changes the shape of the waveform usually adding overtones).
- Envelope:** A time-varying signal used to control the development of another signal after it has been triggered. Envelopes are most often used for controlling a signal's amplitude. The shape of the envelope is determined by the number of control parameters. Usually four parameters are available: Attack Time, Decay Time, Sustain Level and Release Time.
- Filter:** A signal processing device that suppresses or "filters" out specific parts of a signal's frequency spectrum. Numerous types of filter are used in audio synthesis. These include Low Pass, High Pass, Band Pass and Notch. The tone controls on a stereo amplifier are one example of an audio filter.
- LFO:** An LFO or "Low Frequency Oscillator" is a periodic signal source (usually below audio frequency range) used to modulate another signal parameter. An LFO can be used for a variety of effects including vibrato (by modulating the instrument's pitch) and tremolo (by modulating the instrument's amplitude).
- Modulation:** The variation of one parameter by another. For example, a signal's frequency can be "modulated" by an LFO (Low Frequency Oscillator) in which case vibrato is produced.

Monophonic: Literally, “one voiced.” A monophonic sound contains one voice. Any musical instrument that can produce only one note at a time is classed as monophonic.

Multi-sample: A technique used in sample-playback where two or more samples are used to simulate the way the timbre of a sound changes with respect to its amplitude. For example, a piano could be sampled at two different volume levels (“soft” and “loud”). When the instrument is triggered by a low amplitude input signal the “soft” sample is played. When the instrument is triggered by a high amplitude input signal the “loud” sample is played.

Polyphonic: Literally, “many voiced.” A polyphonic sound contains two or more voices. Any musical instrument that can produce two or more notes at a time is classed as polyphonic.

Reverb: “Reverb” (Reverberation) arises from the way that sound is reflected by the surfaces found within a room, and causes the sound to be heard after all sources have ceased. Different acoustic spaces have different reverberant characteristics, many of which can be simulated digitally.

Sample: A recording of a short portion of an audio signal.

Timbre: Timbre is notoriously difficult to define. Having said that, timbre is usually defined as the characteristic tone colour of a sound. Timbre is what distinguishes two notes played at the same pitch and amplitude on different musical instruments.

MIDI Implementation Chart

Product:	SaxLab	Version 2.x	Date: 18.Jan 2008
Manufacturer	LinPlug Virtual Instruments GmbH		
Function	Transmitted	Recognized	Remarks
Basic Channel			
Default	no	no	
Changed	no	no	
Mode			
Default	no	Omni	
Changed	no	no	
Note Number			
True Voice	no	yes	
	no	no	
Velocity			
Note On	no	yes	
Note Off	no	no	
Aftertouch			
Poly (Key)	no	no	
Mono (Channel)	no	yes	
Pitch Bend	no	yes	
Control Change	no	yes	
Program Change	no	yes	
System Exclusive	no	no	
System Common			
Song Position	no	no	
Song Select	no	no	
Tune Request	no	no	
System Realtime			
Clock	no	no	
Commands	no	no	
Aux Messages			
Local On/Off	no	no	
All Notes Off	no	yes	
Active Sensing	no	no	
System Reset	no	no	

Appendix A: Using TUN Files

By Jacky Ligon

About Microtuning

Microtuning, or "microtonality" are methods for tuning musical instruments whereby musicians may explore and compose with ethnic, historical and contemporary tuning-systems. Microtuning musical instruments allows one to use scales which may have pitches lying between the notes of our familiar Western 12 tone scale. These pitches which are found in the 'cracks' of 12 Tone Equal Temperament are one of the things that give musics of Bali, India, Africa, Thailand, Turkey and the Middle East (to name but a few) a special international flavor, but is something that is of immeasurable value to the contemporary acoustic and electronic composer, who may require a more broad palette of musical pitches for their music.

The quest for creating beautiful and musically useful tuning-systems has been an unending process of discovery and debate amongst musical theorists, mathematicians, physicists and musicians going back to early history. Quite often the reasons for microtuning instruments may involve improving the consonant intervals of a tuning-system for sweeter sounding harmonies, as well as offering wider variety of choices for melody. "Microtuning" an instrument can sometimes mean there may be less or more than 12 tones in an octave, or even that the octave itself may be stretched or compressed. Microtuning is a vast topic, rich with lore, music and infinity of musical possibilities for the sonic explorer.

Creating TUN Microtuning Files with SCALA

Scala is a freeware utility developed by Manuel Op de Coul in the Netherlands, which can be used for the creation and analysis of historical, ethnic and contemporary microtunings. A powerful capability of Scala is that it enables the user to create the proprietary tuning data required for microtuning a wide range of hardware and software synthesizers and samplers.

Scala may be used to create the TUN format microtuning-files needed to explore microtunings with this instrument.

The Scala home page is <http://www.xs4all.nl/~huygensf/scala/>

Specifying the Reference Frequency of a Microtuning

One of the powerful capabilities of the TUN file format and Scala, is the ability to specify the pitch and midi note which will be the reference pitch for the microtuning in use. This becomes a very important consideration when one is using a number of different synthesizers and wishes to keep them in tune with a given base frequency. It is very common for one to specify a chosen concert pitch such as A440 Hz or C261.6256 Hz as a reference for a microtuning,

however, the flexibility of the TUN format and Scala enables one to specify this frequency arbitrarily. In Scala this reference is called Map Frequency.

As well as being able to specify the Map Frequency, one can also specify a central midi-note, which will become the starting point for the microtuning in use. Being able to specify a particular midi-note on the controller, provides a way to map a microtuning beginning on any desired midi key, making it easier to navigate the keyboard when there may be more or less than 12 tones per octave, or where one may desire to have the notes of a tuning fall on certain physical keys.

Important Note

When one uses a TUN microtuning file with this software synthesizer, the above specified mapping properties will override the Master Tuning reference. Normally when one is using the default 12 Tone Equal Tempered Scale, the Master Tuning will be used to make fine pitch adjustments around the standard concert pitch of A440 Hz, but when one has specified another pitch base for a microtuning when the TUN file is created in Scala, such as C261.6256 Hz, the data in the TUN microtuning-file will provide a new pitch reference.